

This Doctor Knows Exactly How You Feel

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No one, it seemed, knew what the patient clutching the stuffed blue bunny was feeling. At 33, he looked like a bewildered boy, staring at the doctors who crowded into his room in Massachusetts General Hospital. Lumpy oyster-sized growths shrouded his face, the result of a genetic condition that causes benign tumors to develop on the skin, in the brain, and on organs, hindering the patient's ability to walk, talk, and feel normally. He looked like he was grimacing in pain, but his mother explained that her son, Josh, did not have a clear threshold for pain or other sensations. If Josh felt any discomfort at all, he was nearly incapable of expressing it.

"Any numbness?" asked Joel Salinas, a soft-spoken doctor in the Harvard Neurology Residency Program, a red-tipped reflex hammer in his doctor's coat pocket. "Like it feels funny?" Josh did not answer. Salinas pulled up a blanket, revealing Josh's atrophied legs. He thumped Josh's left leg with the reflex hammer. Again, Josh barely reacted. But Salinas felt something: The thump against Josh's left knee registered on Salinas's own left knee as a tingly tap. Not just a thought of what the thump might feel like, but a distinct physical sensation.

That's because Salinas himself has a rare medical condition, one that stands in marked contrast to his patients': While Josh appeared unresponsive even to his own sensations, Salinas is peculiarly attuned to the sensations of others. If he sees someone slapped across the cheek, Salinas feels a hint of the slap against his own cheek. A pinch on a stranger's right arm might become a tickle on his own. "If a person is touched, I feel it, and then I recognize that it's touch," Salinas says.

The condition is called mirror-touch synesthesia, and it has aroused significant interest among neuroscientists in recent years because it appears to be an extreme form of a basic human trait. In all of us, mirror neurons in the premotor cortex and other areas of the brain activate when we watch someone else's behaviors and actions. Our brains map the regions of the body where we see someone else caressed, jabbed, or whacked, and they mimic just a shade of that feeling on the same spots on our own bodies. For mirror-touch synesthetes like Salinas, that mental simulacrum is so strong that it crosses a threshold into near-tactile sensation, sometimes indistinguishable from one's own. Neuroscientists regard the condition as a state of "heightened empathic ability."

This might sound like a superpower of sorts, a mystical connection between one person's subjective experience and another's. But to be clear, Salinas cannot read minds. He doesn't know whether Josh felt the impact of the reflex hammer, and the tingling in his kneecap says more about his own extraordinary nervous system than it does about that of his patient. What's more, for those who experience mirror-touch synesthesia—an estimated 1.6 percent of the general population—the condition is often more debilitating than it is empowering.

Mirror-touch synesthetes struggle with the constant intrusion of others' feelings. At a symposium on mirror-touch synesthesia last year in London, a woman named Fiona Torrance of Liverpool described how she had once seen one man punch another. She promptly passed out in a car. Her boyfriend at the

time found her unconscious and took her to the hospital. “I felt the punch,” she explained. As a child, she once saw a man kill an otter with a spade on television. She was inconsolable for a month, feeling as if she’d killed the otter herself. To this day, she takes medication to control the sensory onslaught, and she does not own a television. A recent episode of the NPR program *Invisibilia* profiled another woman with the condition who has essentially become a shut-in.

Even among those who are fairly high-functioning, the condition closes off options. Carolyn Hart, a mirror-touch synesthete from San Francisco, wanted to be a physical therapist. But she couldn’t get past the injuries she would have witnessed daily. “The synesthetic pain on a constant basis would have been too much for me to tolerate,” she said. So she became a massage therapist instead, and now spends 35 hours a week exposing herself to the pleasurable sensations that clients feel under her hands, which can feel like “waves of warmth” through her own body.

Salinas, then, is a remarkable case in a couple of ways. As a neurologist, not only is he far better equipped than most people to understand the peculiarities of his own brain, but he also exposes himself daily to immense doses of other people’s pain and discomfort. His patients suffer from strokes, spinal cord injuries, multiple sclerosis, and a myriad of other disorders and injuries. Some are also depressed, anxious, or in extreme pain. When Salinas performs a spinal tap on a patient, he can feel the needle going into his own lower back. When a psychotic patient goes into a rage, Salinas feels himself getting worked up. Even when patients die, Salinas feels an involuntary glimmer of the event firsthand. His body starts to feel vacant—empty, like a limp balloon.

And then he moves on to the next patient.

Researchers hope that studying the brains of mirror-touch synesthetes may shed light on the biological mechanisms behind ordinary human empathy, interpersonal relationships, and what scientists call “self-other processing.” Spending time with Joel Salinas reveals how a person can function expertly, even during emergencies, amid a deluge of other people’s feelings.

For centuries, scientists have known that some people’s senses get crossed. Some of us hear words in colors. Others see music in bright bursts or glimmers. Some might see dates and numbers floating in space. Studies have shown that about four percent of the population has some form of synesthesia, which tends to run in families. And if you have one form of synesthesia, it appears likely that you will have another as well.

Salinas, for instance, also sees letters and numbers in colors, a condition known as grapheme-color synesthesia. Furthermore, he associates these colored characters with personality traits and feelings. For example, a certain person might feel like a five, which to Salinas is a red-orange color that he associates with pride and self-interest. “People with strong fours and sevens are a cool grayish blue—sky blue with Russian blue. Very soothing.”

Mirror-touch synesthetes vary in how intensely they register the feelings of others. Some report feeling sensations of pain more viscerally, and even claim to feel temperatures vicariously. Others describe feeling another person’s pain as a mere tickle, tingle, or twinge. Salinas experiences other people’s

sensations of injury and intense emotions, but only to a muted, partial degree. If he saw someone being stabbed in the arm, he says, he would not feel the sharpness of the blade but rather “an echo of pain” on his own arm.

Salinas can most easily manage synesthetic feelings that he anticipates or has experienced before: Watching someone else scratch themselves, or get an IV put in, or a spinal tap, or having their knee tapped with a reflex hammer. But when he is startled by a sensation, the feelings can overwhelm him. A few years ago, he watched the horror film *The Last Exorcism*. One scene showed a woman whose neck had been broken, and Salinas was suddenly gripped by the sensation of his own neck twisting around backward, his spine cracking, and hints of asphyxiation.

While other types of synesthesia have been studied for ages, scientists have only been studying mirror-touch synesthesia for a little over a decade. In 2005, a cognitive neuroscientist in London, Sarah-Jayne Blakemore, became the first to document a case involving a 41-year-old woman who said she experienced touch when observing touch on others. The woman was surprised to discover that this ability was abnormal, Blakemore wrote in her paper, published in *Brain*. Since then, two British psychologists, Michael Banissy of Goldsmiths, University of London, and Jamie Ward of the University of Sussex, have been studying as many people as they can find who exhibit mirror-touch synesthesia. So far, they have tested and interviewed 30 such individuals in their labs, and MRI-scanned 11.

They have found that their subjects recognize the facial emotions of others better than people without mirror-touch synesthesia. According to Banissy and Ward’s 2011 paper in the *Journal of Neuroscience*, when shown photographs of people grinning, frowning, smirking, scowling, or musing, mirror-touch subjects scored significantly higher than non-mirror-touch individuals on reading social cues that indicated that a person was feeling confident, stressed, sad, perplexed, or mystified. They’ve also found that mirror-touch synesthetes tend to have a greater volume of gray matter in areas of the brain linked to social cognition and empathy, and less brain volume in the temporoparietal junction, which plays a key role in distinguishing self from other.

There is still a huge amount to be learned about the condition, though, and the specific mechanisms behind mirror-touch synesthesia remain somewhat mysterious. Outside a tiny world of researchers, the condition is so little known, and sounds so otherworldly, that it is still often met with skepticism—which is why, for Salinas, coming out as someone with synesthesia has felt similar to coming out as gay. “You never know who is going to be open to it. It’s not something you easily bring up in conversation.”

When he started dating the man who is now his husband, Salinas waited a while before he divulged anything about his synesthesia. When he finally did bring it up, his then boyfriend responded with the obvious questions most people have: “What about when I do this?” (Poking his own eye.) “Is it annoying?” At least half of Salinas’ friends have asked what he feels when he sees pornography. Salinas avoids that discussion altogether.

Perhaps the greatest testament to Salinas’ coolness under fire as a doctor is the fact that very few of his colleagues—an esteemed medical bunch—even know he has a condition. But to say the least, living inside Salinas’ skin was not always so manageable.

Salinas was born in Miami, Florida, to a pair of political refugees from Nicaragua. In the family's difficult early years in America, Salinas' father, an educated man, delivered pizzas and newspapers; his mother worked at a deli counter. Salinas can remember feeling his parents' exhaustion in his own body. On one of the few occasions when his parents talked in front of him about the Nicaraguan revolution—relaying their memories of the Sandinistas raiding their town, breaking into homes, assaulting neighbors—Salinas felt their numbness, recognizing even then that his parents were dampening the emotions associated with the memories. He was five at the time.

As an emotionally precocious and hypersensitive child, Salinas avoided the sensory over-stimulation of sports or running around with packs of kids. He preferred to read alone, or sit with adults. He remembers being fascinated by their faces, their reactions. Sometimes he engaged in self-soothing behaviors, like flapping his arms. "People probably thought I was autistic," Salinas says. In school, he sensed that other kids found his perceptiveness invasive and weird. "I made irritating commentaries if I picked up on someone's emotions and tried to bring it up," he recalls. "It was really out of place."

Witnessing schoolyard fights was particularly debilitating for Salinas. On one occasion, two girls went at each other on a gravel parking lot, each one grabbing the other's hair, rotating while clawing at the other. "It gave me a headache at the top of my head," Salinas remembers. "The tugging."

But in high school's morass of angst-ridden teenagers, Salinas was forced to learn how to regulate his own emotional responses. He learned who to stay away from, how to calm his own mind, how to let sensations pass—skills that he would come to master and rely upon as a physician. The key was learning to direct his attention. Instead of focusing on the fidgeting and overwrought emotions of his peers, he directed his attention to his teachers, or focused on schoolwork.

An unusual facet of Salinas' mirror-touch synesthesia is that it extends to inanimate objects. When he looks at a light pole, he might feel his body stretching, elongating, and narrowing. When he sees the headlights and bumper of a car, he might feel his face contorting into the shape of the vehicle's front end. And so as he grew older, Salinas learned that inert physical objects, too, could be a refuge for his attention when other stimuli were overwhelming.

Salinas' ability to achieve a kind of serenity in the middle of chaos was fortified during his time as a medical student and resident, especially when he worked in the emergency room. It would take all of Salinas' strength to stay professional as he treated gunshot and car-crash victims, informed distraught families that their loved ones were brain dead, and, most vividly, treated a man whose arm had been ripped off by a train. To calm himself he would take deep breaths and focus on the calmest person in the room. Or sometimes on a sleeve, or a collar. All too easily, he could become the man writhing in pain, his arm in shreds. Or he could become the grieving mother. But if he really focused, he could also be the sleeve.

Surprisingly enough, it wasn't until the summer after his first year in medical school that Salinas realized his condition was unusual, and that it had a name. During a medical trip to India, he heard a friend with a neuroscience Ph.D. talking about people who experience colors as sound. Salinas pulled him aside

afterward and asked, “Isn’t that everybody?” Salinas had always figured others saw the world the way he did, in colors and feelings. “I just figured it was like being human,” he said.

In 2008, Salinas became a clinical research fellow at the University of Iowa’s Carver College of Medicine; his research there focused on the development of the parietal lobe, the region of the brain responsible for visual-spatial navigation and integrating the skin’s sensory reactions to heat, cold, touch, and pain with the brain’s internal map of the body. While he was there, Salinas felt moved to bring up his synesthesia—and one other fact about his medical history—with a research mentor.

When Salinas was 22, he had undergone surgery to remove a benign tumor from the right topside of his brain; doctors had discovered the tumor after Salinas came down with a hellishly severe headache. Now, Salinas and his mentor began to wonder about the tumor. Could it have been there since childhood, growing quietly over the years? If so, could his parietal lobes have developed differently from others, causing him to feel touch—and other people’s touch—differently, too?

With his mentor’s encouragement, Salinas began to get involved with more research into synesthesia. He volunteered to be a subject in the research of the neuroscientists V.S. Ramachandran and David Brang on grapheme-color synesthesia, traveling to San Diego to undergo a series of tests. It was there that Salinas learned about mirror touch. When he later came across the work of Banissy and Ward, including a 2007 paper in *Nature Neuroscience* called “[Mirror-Touch Synesthesia Is Linked With Empathy](#),” he realized they were describing him.

Some researchers have suggested that we are all born with synesthesia, and that the natural cross-sensory brain activity we experience as babies goes into decline as we grow older. Among synesthetes, according to this theory, this normal erosion of the synapses fails to occur for some reason. When Salinas got in touch with Banissy and Ward and asked about his brain tumor, they said that synesthesia has been known to develop in some people after a stroke or head trauma, but it was hard to speculate in his case. They did, however, want to meet him.

And so, in November of 2014, Salinas found himself in England, sitting in Banissy and Ward’s labs for a few days of tests. In one of them, the researchers had Salinas look at an image of a face on a screen. A hand reached out and touched the face. At the same time a tapper machine with a pin at the end of it pricked Salinas on his face, sending a soft electric charge against his skin. To Salinas, the sensation of the tapper felt very much like the tingling he gets while experiencing other people’s feelings every day. The task was to identify where he was actually being touched. When the finger touched the person on the screen on the left side of his face, the tapper pricked Salinas on his right. Yet Salinas felt like he was being touched on both sides of his face. Try as he might, he had trouble distinguishing the mirror-touch sensations from the actual pricks on his skin.

In another test, though, Salinas watched a slideshow of images: a person with a sprained ankle; a fracture, with the bone protruding beneath a sock; a skateboarder who had fallen on his back; a thumb spiked with a nail; a knife against someone’s throat. He also saw images of a foot being hammered, a hand under an iron, an elevator closing on a foot. Some of these pictures sparked only a glimmer of sympathetic sensation in Salinas. He thought it might have been because he could tell they were staged.

But these images of injury and risk were also similar to the scenes that he has learned to withstand throughout his life as a doctor, as they've washed over him day in and day out. These kinds of scenes have become, to him, like overheard conversations one might tune out in a crowded coffee shop.

There are many ways in which mirror-touch synesthesia probably makes Salinas a better doctor. In recent years, there has been a lot of talk in medical circles about the decline of doctors' observational powers; as more and more diagnostic work is done by machines, the fear is that physicians are becoming worse at paying close attention to patients with their own eyes and ears. Some hospitals have even taken to offering doctors modified classes in art appreciation, in an attempt to revive their atrophying skills of pattern recognition and awareness.

Salinas' condition arguably makes him unusually gifted at these tasks. For part of the morning on the day I shadowed him at Massachusetts General Hospital, Salinas led a group of medical residents on a set of hospital rounds. The team wheeled their laptops on rolling desks through the halls. At one point, one of the residents yanked an electrical plug out of a socket and accidentally electrocuted himself in the process. Instantly, a shock raced up his arm and his head slammed against the sharp edge of a chart bin on a wall.

Salinas not only saw the accident, he felt the jerking movement in his own arm, and felt his head hitting a wall. He tuned into the situation immediately, rushing to the resident's side and asking, "Are you OK?" (The resident was fine.) Few others in the hallway had even seemed to notice the mild shock.

Empathy itself is another quality that modern doctors are said to lack in sufficient doses. Here, too, Salinas' mirror-touch synesthesia gives him advantages, particularly his heightened facility for reading people's facial expressions and emotional states. He says he usually zeroes in on a person's mouth, more than any other body part, when reading emotions. In one patient's room on the day I visited, a man with severe dementia lay sprawled and smiling on his back on a bed encircled with rails and padded floors. Just the day before, he had been so agitated he had to be put in restraints, but medication had dramatically changed his demeanor, and he cheerfully waved his right hand to greet Salinas when he approached. But the patient's wife and daughter were not in high spirits.

"There's not going to be much change ever, is there?" the wife asked Salinas and his supervisor.

"It's the nature of the disease," the supervisor said. "It tends to be progressive."

How much longer did he have left to live?

"A week or six months; it's hard to say."

The doctors were about to leave, but Salinas noticed the daughter's mouth. "She had thin lips, and they tightened at the edges," he recalled. "She furrowed her brows." Salinas knew that the daughter was not satisfied with this answer, so he interjected to keep the consultation going until the mood shifted. By the time their interaction finally ended, the corners of her mouth had softened—an expression Salinas felt as relief.

But often, his synesthesia simply sensitizes him to his environment in ways that most of us could hardly contemplate. This sensitivity has become fundamental to his life as a doctor.

In another hospital room that day, an HIV patient who had developed a fungal infection in her brain lay in bed, screaming, groaning, hacking, and vomiting. She had developed pulmonary edema from fluid backing up in her lungs. The nurse in charge was visibly stressed, saying to Salinas: "I feel like she's escalating, getting more uncomfortable. It's just, like, what do we do?" The patient screamed louder, heaving from her abdominals, her shoulders rising and dropping. The family stood nearby looking terrified.

Salinas felt the brunt of the nurse's anxiety and the family's distress. As he later described to me, he could feel the patient's heaving, constricted chest, his own chest rising and falling with hers. When she took a turn for the worse and was intubated, Salinas said, he felt the tightening of his vocal chords as if being intubated himself. Yet as I watched Salinas manage the emergency, he never seemed ruffled. When he explained to the distraught family members that the patient would need to be put on a ventilator, he addressed them in calm, measured Spanish.

It was 7 p.m., the end of his shift, when Salinas removed his white doctor's coat and replaced it with a heavy black parka with a fuzzy hood. He swapped his stethoscope for a black briefcase. I followed alongside as he made his way to an elevator, before stepping into a crowded main lobby and then into the bustling Boston streets, filled with commuters. I asked what it felt like for him to move through the throng of people. Could he describe it to me moment by moment?

When the elevator doors had opened, a man on a knee scooter, his left leg folded up beneath him on the seat, rolled in after us. Salinas told me he felt his own leg folded beneath him at the knee. He began to point out more people around him: A woman with a phone pressed against the right part of her face; he felt the hardness of the phone. A woman rushing down a set of stairs, her bobbing hair in a bun, a few strands against her face; he felt the wispieness.

His descriptions came rapid-fire as the crowd swelled. Feelings, gestures, movements, facial expressions; so many people passing by so fast that I wouldn't have paid the slightest attention to them on my own. A husky man in a corridor wearing a knit hat: "I felt the heaviness of the knit hat on my head." A woman sitting at a table on a balcony, tapping her fingers together: Salinas felt the fingers touch. Another woman at the bottom of the escalator, legs crossed: He felt the tangle of the legs. An elderly, heavysset woman wobbling from side to side: He felt the slow sway in his hips.

We were outside now, moving down Cambridge Street. Salinas felt the posture of a man running by us with his hands in his pockets, and the fiddle of small fingers as a baby in a stroller fondled his own lips. He noticed a whiskered man: "I feel the heaviness of the beard." And a man with his eyebrow slightly elevated: "I felt it on my left eyebrow.... He's slightly uncomfortable." He felt the man's glasses on his nose, too. There was a woman with one feather from a parka hoodie flapping against her forehead: "That stray kind of feather-fur-tuft out of place," he said—he felt it on his forehead. A woman tugging at the bottom of her coat: "I was able to appreciate the smoothness of the button."

In hearing his stream of descriptions, I could almost understand what Salinas meant when he described the daily bombardment of ambient feelings as a kind of white noise. It's as if Salinas feels everything and nothing at the same time. By necessity, he keeps himself remarkably detached from all the errant sensations that tug at his attention. He would probably lose his sense of self if he didn't. And the most surprising thing about him, once you know all this, is that being in his presence is calming.

Pacific Standard

<http://www.psmag.com/health-and-behavior/is-mirror-touch-synesthesia-a-superpower-or-a-curse>

http://www.daysyn.com/Banissy_Wardpublished.pdf